

## CLAIMS

We Claim:

1. A variable optical attenuator for attenuating optical signals transmitted from an input fiber to an output fiber, comprising:

a rotatable mechanism between the input fiber and the output fiber; and

a refractor mounted on and being rotatable with the rotatable mechanism which is driven to deflect light beams from the input optical fiber and then to couple part of the light beams into the output fiber, the refractor being rotatable to different angles to change the incident angle of the input light beams and then to output refracted light beams that are deflected from the axis of the input light beams as determined by the incident angle to continuously change the amount of the light beams into the output fiber.

2. The variable optical attenuator as claimed in claim 1, further comprising two collimators for containing the input fiber and the output fiber, respectively.

3. The variable optical attenuator as claimed in claim 1, wherein the rotatable mechanism comprises a fixing block and a rotatable post extending from the bottom of the fixing block.

4. The variable optical attenuator as claimed in claim 1, further comprising a holder to hold the rotatable mechanism and hold the two collimators in alignment with each other.

5. The variable optical attenuator as claimed in claim 1, wherein the refractor is a lens.

6. The variable optical attenuator as claimed in claim 5, wherein the refractor has two parallel surfaces.

7. The variable optical attenuator as claimed in claim 6, wherein the refractor has anti-reflective coatings covering the two parallel surfaces.

8. A variable optical attenuator comprising:

an input port and an output port facing to each other along an axial direction, said input port including an input GRIN lens and an input ferrule, said output port including an output GRIN lens and an output ferrule;

a refractor positioned between said input port and said output port, said refractor being rotatable about an axis perpendicular to said axial direction; wherein

when said refractor extends perpendicular to said axial direction, light from the input GRIN lens penetrates said refractor and substantially fully enters the output GRIN lens, while when said refractor is tilted relative to the axial direction with therebetween an angle different from ninety degrees, attenuation occurs.

9. The attenuator as claimed in claim 8, wherein said attenuation follows a formula as follows:  $\text{Attenuation} = -10 \log \eta$ , where  $\eta$  is lateral displacement effect between an axis of the input beam and an axis of the output beam, given by  $\eta = 2 \times \cos^{-1}(d/a)/\pi - d \times \text{SQRT} [1 - (d/2a)^2] / \pi a$  and  $d = h \times \sin [\theta - \sin^{-1}(\sin \theta / n)] / \cos [\sin^{-1}(\sin \theta / n)]$ , wherein

$\theta$  is an incident angle for an input beam from the input GRIN lens with regard to the refractor;

$d$  is a lateral deflection relative to the axis of the input beam;

$a$  is a core radius of an optic fiber used in the attenuator; and

$h$  is a thickness of the refractor.